REMARKS/ARGUMENTS

Status of the Claims

Claims 26-37, 40-42, 44-48, and 60-69 are pending with entry of this amendment. Claims 26, 30, 31, 34, 35, 37, 40, 41, 44, and 62 are amended herein. Claims 64-69 are added herein. These amendments introduce no new matter and support is replete throughout the specification. These amendments are made without prejudice and are not to be construed as abandonment of the previously claimed subject matter or agreement with any objection or rejection of record.

With respect to claim 26, support for the aspect of interaction of optical properties of the nanocrystals subsets as a characteristic of the unique spectral code of the composition can be found throughout the specification, including at paragraphs 13, 40, 48, 53, 70, 75, 99, and 101.

Support for new claim 64 can be found in paragraph 13, which explains the potential use of emission of one nanocrystals subset as an excitation light source for another nanocrystals subset.

New claim 65 is supported by the specification at paragraph 59.

New claim 66 is supported by paragraph 75 and Figure 3C.

Support for new claims 67 and 68 is replete throughout the specification. For example, see paragraphs 4, 42, and 82.

The aspect of characteristic excitation/emission polarization angles of new claim 69 is supported by the specification at paragraphs 41, 53, 59, and 99.

Amendments to claims 30, 31, 34, 35, 37, 40, 41, 44, and 62 consist of minor grammatical corrections and corrections to antecedent basis required by the amendment to claim 26.

Applicants submit that no new matter has been added to the application by way of the above Amendment. Accordingly, entry of the Amendment is respectfully requested.

35 U.S.C. § 103(a)

Claims 26-37, 40-42, 44-48, and 60-63 were rejected under 35 U.S.C. § 103(a) as allegedly obvious based on Bruchez et al. (US 6,274,323, hereinafter Bruchez) variously in light of Mahamuni et al. (J. Applied Physics, 85: 2861-65), Cao et al. (Angew. Chem. Int. Ed., 1999, volume 38 (24): 3692-94 (1999)), Weiss et al. (WO 00/55,631), and Bruchez et al. (Science 281: 2013-2016 (1998), hereinafter Bruchez (1998)). To the extent that this rejection is applicable to the amended and new claims, Applicants respectfully traverse.

A proper analysis under the Graham v. John Deere standard demonstrates the non-obviousness of the invention. According to the Supreme Court in *KSR International v. Teleflex* (550 U.S. 398 (2007); 127 S. Ct. 1727, 1740-41, 82 USPQ2d 1385-96 (2007)), the appropriate standard for analyzing questions of obviousness is that:

> The scope and content of the prior art are determined, differences between the prior art and the claims at issue are analyzed and the level of ordinary skill in the pertinent art is resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unresolved needs, failure of others, etc. might be utilized to give light to the circumstances surrounding the origin of the subject matter to be patented.
>
> *Id.* quoting *Graham v. John Deere of Kansas City*, 383 U.S. 1, 17-18.

The current examination guidelines (e.g., MPEP 2143) and *KSR* require the Office in an obviousness rejection to provide a statement as to why one of skill would have combined known elements.

Further, an obviousness rejection must include fact-based findings demonstrating: 1) a combination of reference elements describing each limitation of the claims, 2) known elements that function in the same way in the combination as in the references themselves, 3) the elements are combined by known methods, 4) the result of the suggested combination of elements would have been predictable, and 5) one of skill in the art would have expected success in providing the claim in light of the references. Further, *KSR* requires that the Office should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."

The claims are not obvious based on Bruchez and Mahamuni. Claims 26-29, 31-32, 34-35, 37, 40, 46-48, and 60-63 were rejected under §103(a) as obvious based on Bruchez and Mahamuni. Neither Bruchez, Mahamuni, nor the combination of the two contain all the limitations of the present claims.

With respect to Applicants' amended independent claim 26, the prior art references fail to teach a unique spectral code which "comprises at least one optical property defined by the interaction of optical properties of at least two of the two or more subsets of nanocrystals, wherein the interaction is other than the excitation wavelength of a first nanocrystal subset exciting a second nanocrystal subset." This amendment clarifies an important distinction between one embodiment of the present invention and the prior art—the present invention provides a composition with greater tagging capabilities by embracing the interaction of optical properties between nanocrystal subsets to greatly increase the number of possible codes for tagging objects. The unique spectral codes of Applicants' inventive compositions are novel and unique in that they use more and different combinations of optical properties to create a greater number of possible codes for tagging objects. To the contrary, Bruchez teaches away from embracing such interaction of optical properties between nanocrystal subsets. For example, Bruchez notes in column 4 that the invention is aimed at reducing interaction of optical properties between nanocrystal subsets by providing "adequate separation between the absorption and emission frequencies." As explained throughout Bruchez, the invention provides a nanocrystal composition which will allow each individual analyte to be tagged with distinct nanocrystals of the composition with distinct emission wavelengths so that the individual analytes can be distinguished by those distinct properties. The distinct nanocrystals have different affinities for different analytes so that the distinct nanocrystals of the mixture will separate to create distinct tags for the different anaytes for easy detection of the different analytes. Column 7 of Bruchez states that each complex of the plurality of complexes comprises "a *different* specific-binding molecule each bound to a conjugate which specifically binds each specific-binding molecule and where each specific-binding molecule binds a *different* analyte, and wherein each conjugate bound to a different specific-binding molecule comprises *a*

semiconductor nanocrystal that has a characteristic spectral emission distinct from the other semiconductor nanocrystals; and wherein changes in the spectral emission of any selected semiconductor nanocrystal associated with a particular specific-binding molecule in a first complex, indicates the presence of an analyte that binds to the particular specific-binding molecule." (Emphasis added.) Thus, Bruchez is concerned with *distinguishing* between the individual nanocrystals by their *different* properties (distinct spectral emission wavelengths) rather than detecting the optical properties of the mixture as a whole. Unlike Bruchez, the entire composition of Applicants' claim 26 applies to a single tagged object so that the collection of all nanocrystal subsets in the entire composition are used to tag a single object, and the interaction of optical properties of the individual subsets is embraced, rather than eliminated as in Bruchez, to create a greater number of possible codes for the composition. If Applicants' composition of claim 26 were applied to the method in Bruchez, the composition would not function to achieve the detection of individual analytes, which is the aim of Bruchez. Applicants' claimed interaction of optical properties of individual nanocrystal subsets as a defined characteristic of the spectral code would make it impossible, or at least very difficult, to distinguish between the individual analytes in the sample of multiple biological/chemical analytes.

Mahamuni does not cure the deficiency of Bruchez to anticipate or obviate the present invention. First, Bruchez teaches away from using multiple excitation wavelengths as in Mahamuni since Bruchez uses narrow emission spectral widths so as to allow for the "simultaneous detection of a variety of biological moieties." (See Bruchez, column 5, lines 12-16.) Second, Mahamuni is limited to the study of the properties and defects of the synthesized nanocrystals. Mahamuni does not teach a composition for tagging objects or a composition defined by a unique spectral code. Consequently, the present claim 26 and the corresponding dependent claims are not rendered obvious by Bruchez and Mahamuni.

To the extent that this obviousness rejection applies to new independent claims 67 and 69, Applicants respectfully traverse. With respect to Applicants' claims 67 and 68, neither Bruchez nor Mahamuni teaches "a composition for tagging and detecting objects

other than molecules, biomolecules, chemical elements, and chemical compounds." Bruchez is specifically limited to the use of semiconductor nanocrystals as detectable labels in chemical and biological applications, and the methods and compositions explained in Bruchez are very specifically targeted to such applications.

With respect to Applicants' claim 69, neither Bruchez nor Mahamuni teaches a nanocrystals composition with excitation and/or emission polarization angles as a characteristic of a unique spectral code for the composition.

The claims are not obvious based on Bruchez, Mahamuni, and Cao. Claims 33, 36, and 41-42 were rejected under §103(a) as obvious based on Bruchez and Mahamuni. Neither Bruchez, Mahamuni, Cao nor the combination of the three contain all the limitations of the present claims. For the reasons explained above, the Bruchez and Mahamuni do not anticipate or obviate the present claims. Cao does not solve this deficiency. Examiner alleged that the Figure 1 spectra of Cao which "varies in a predetermined manner based on nanocrystals size…demonstrates a reference by which to verify size distributions of nanocrystals." However, variation in nanocrystals size would not provide a spectral code defined by interaction between optical properties of different nanocrystals subsets, as required by the limitation in Applicants' claim 26. Figure 1 of Cao shows the different absorption wavelengths of nanocrystals with varied shell thicknesses. These different absorption wavelengths do not interact, as anticipated by the authors—the purpose of varying shell thickness was to achieve different properties, as accomplished. Thus, Cao does not achieve the interaction of optical properties claimed by Applicants in amended independent claim 26, and the combination of Bruchez, Mahamuni, and Cao does not render the present claims obvious.

The claims are not obvious based on Bruchez, Mahamuni, and Weiss. Claims 44-45 were rejected under §103(a) as obvious based on Bruchez, Mahamuni, and Weiss. Neither Bruchez, Mahamuni, Weiss, nor the combination of the three references contain all the limitations of the present claims. Examiner cited Weiss for its alleged predetermined excitation and emission spectra" with varied nanocrystals size. However, Weiss does not teach the limitations required by the present version of the claims. Like Bruchez, Weiss is aimed at detecting different individual analytes with corresponding

distinct nanocrystals. Weiss relies on different nanocrystals with different properties, as in Bruchez. Weiss does not teach the limitation of a unique spectral code defined by the interaction of optical properties of different nanocrystals. Thus, claim 26 and the corresponding dependent claims are not made obvious by Bruchez, Mahamuni, and Weiss. With respect to new claims 67 and 68, Weiss applies specifically to nanocrystals probes for biological applications—specifically biomolecular applications. Weiss allows simultaneous detection of a number of detectable molecular substances in a biological material. Weiss does not render claim 67 obvious since it is very specifically tailored to biomolecular analytes, and thus does not apply to tagged objects "other than molecules, biomolecules, chemical elements, and chemical compounds. With respect to new claim 69, Weiss provides no mention of using polarization angles as a characteristic in the composition spectral code.

The claims are not obvious based on Bruchez, Mahamuni, and Bruchez (1998).

Claim 30 was rejected under §103(a) as obvious based on Bruchez, Mahamuni, and Bruchez (1998). Neither Bruchez, Mahamuni, Bruchez (1998), nor the combination of the three references contain all the limitations of the present claims. As explained above, Bruchez and Mahamuni do not render independent claim 26 obvious at least because the "interaction of optical properties of at least two of the two or more subsets of nanocrystals" aspect of the claim is not taught by the references, either alone or in combination. Bruchez (1998) does not solve this deficiency, so the suggested combination does not obviate the present claims. With respect to new independent claims 67 and 69, Bruchez (1998) does not teach using polarization angles as a characteristic of a spectral code or a composition for tagging objects other than biomolecules, molecules, chemical elements, or chemical compounds. As noted by Examiner, Bruchez (1998) investigates semiconductor nanocrystals as fluorescent biological labels. Therefore, the present claims are not obvious based on Bruchez, Mahamuni, and Bruchez (1998).

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the claims are deemed not to be in condition for allowance after consideration of this Response, a telephone interview with the Examiner is hereby requested. Please telephone the undersigned at (650)331-2209 to schedule an interview.

Respectfully submitted,

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